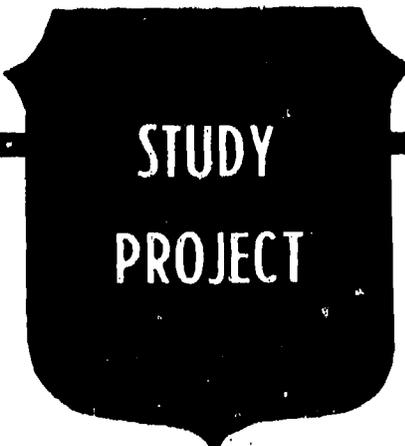


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THE ARMY NEEDS A STRATEGIC ARMORED GUN SYSTEM--NOW!

BY

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THE ARMY NEEDS A STRATEGIC ARMORED GUN SYSTEM-- NOW!

AN INDIVIDUAL STUDY PROJECT

by

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ABSTRACT

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When the United States conducted Operation JUST CAUSE in Panama in December 1989, combat operations against the Panamanian Defense Force were spearheaded by a small force of armored vehicles belonging to the 82d Airborne Division. Although these M551 Sheridans were generally older than the troopers who operated them, they performed adequately against an opponent who was virtually lacking in armor, in what was essentially a low-intensity conflict scenario. Barely eight months later, in August 1990, the 82d Airborne's Sheridans again spearheaded a strategic deployment, designed to counter an imminent Iraqi threat to Saudi Arabia. This time the potential adversary possessed an inventory of over 4000 main battle tanks, some as technologically sophisticated as the Soviet T-72, as well as forces with recent combat experience in mid-to-high intensity warfare. This study seeks to examine the requirement for a modern, technologically advanced replacement for the light armored vehicle in the airborne division and other light combat formations where the need for strategic deployability and lethal tank-killing ability are of paramount importance. This vehicle, the Armored Gun System (AGS) has been a fleeting requirement for some 20 years. A brief history of the Armored Gun System will be presented as well as a detailed review of its required operational capabilities. The U.S. Army has expressed interest in both a traditional research and development methodology as well as a non-developmental approach (NDI) to meet the AGS requirement. A number of potential "off the shelf" candidates to replace the aging Sheridan in the airborne division will be reviewed, as will changes in both aircraft and airdrop equipment and procedures that will expand the range of options available to the combat developer. Additionally, recommendations will be made for the inclusion of the AGS in a new light Corps armored cavalry regiment. The study will conclude with recommendations on a course of action to resolve the long overdue requirement for a strategic Armored Gun System capable of rapid deployment and effective combat operations across the entire operational continuum.

INTRODUCTION

The invasion of Panama during Operation JUST CAUSE began as a textbook operation. Shortly after midnight on 20 December 1989, Army Rangers conducted simultaneous parachute assaults onto the airfields at Torrijos- Tocumen International Airport and Rio Hato; Navy SEALs infiltrated Paitilla Airport from the sea; and a mechanized infantry battalion task force (+) attacked the headquarters of the Panama Defense Force (PDF) in the heart of Panama City.

In order to expand the critical lodgement of U.S. forces at Torrijos- Tocumen and to provide heavier firepower to block the entry of PDF armored forces from the east, the 82d Airborne Division conducted a follow-on parachute assault, initiated by the low velocity airdrop of over 80 vehicles and tons of supplies, commencing at 0135. Among the airdrop loads were eight combat- loaded M551 Sheridans of C Company, 3rd Battalion, 73rd Armor, which established the historical record of being the first American unit to airdrop light armor into combat.¹

During subsequent combat operations in Panama, the Sheridans successfully performed the classic roles of armor/armored cavalry: reconnaissance, security, lethal fire support to dismounted forces, and shock effect.² Perhaps more than anything else, the aging Sheridan demonstrated to its many critics that it remains the only armor system with the strategic capability to accompany assault forces during forced entry operations, even if subsequent combat operations proved to be strictly low-intensity in nature.

It did not take long for the 82d Airborne Division to again test its strategic deployment capabilities. On 8 August 1990, the first American troops to arrive in

Saudia Arabia as part of Operation DESERT SHIELD were elements of the division, spearheaded once again by airlanded Sheridans. The Middle East is not Panama, however, and Iraqi forces poised on the Saudi border counted over 4000 main battle tanks in their inventory, including some 1400 T-72s.³ As tough a fighting unit as it is, and as most military experts were quick to note, the 82d Airborne did not possess the combat power to halt a multi-division tank assault in the desert, even if United States Air Force and Navy carrier aircraft had been able to establish limited air superiority.⁴ Nevertheless, the fact remains that the 82d Airborne was the only U.S. division with the capability to alert, marshal, and strategically deploy in sufficient time to delay and deter the Iraqi advance and buy time for the necessary combat force buildup to defend against aggression. This strategic projection capability did assume a risk, for until the first of approximately 33,000 U.S. Marines began landing on 14 August to marry up with equipment off-loaded from maritime prepositioning ships (MPS) the 82d Airborne Division remained the only United States ground combat force in the theater-- and the aging Sheridan the only armor.⁵

Although much has been made of the fact that American forces were deployed to the Persian Gulf without a developed Time- Phased Force Deployment List (TPFDL), astute military observers such as former USAREUR Commander, General Glenn Otis, pointed out that the deployment did in fact adhere to the script that U.S. military planners have been espousing for years, that is, the early introduction of light forces followed closely by main battle tanks that provide the needed punch for combat operations.⁶ Numerous observers expressed grave concern over why it took so long to get to the Persian Gulf after a deployment decision was made, stressing the inadequacy of our strategic air and sea lift. While certainly worthy of discussion, the thesis of this paper takes a slightly different bent: can we afford to continue to assume risks in a mid-intensity

environment such as the Middle East with armored vehicles that possess outdated technology and are generally inferior to those of potential adversaries, simply because they are the Army's only light armor vehicles capable of responsive strategic airlift?

While it has been widely conceded by military analysts that the M1A1 Abrams main battle tank is the most technologically advanced, lethal, and survivable combat vehicle on today's modern battlefield, the M1A1 is not a readily deployable system. I must therefore concur with other experts that even if a nation has the best fighting force and equipment in the world, if it can't bring it to bear where and when needed, then it may in fact be useless.⁷ This study does not intend to suggest that the main battle tank is a dinosaur that has no place on the modern battlefield, but rather that the United States Army needs to refocus its warfighting strategy to obtain the optimal mix of units and equipment to meet the challenges of the future. I submit that the United States Army does in fact need a strategic, airborne, armored gun system -- now, not later. This goal should focus on two of the fundamental imperatives laid out by the Chief of Staff of the Army, General Carl E. Vuono, in his White Paper of January 1990:

- Maintain a sufficient and balanced force structure.
- Modernize continuously to maintain warfighting capabilities.⁸

THE CHANGING THREAT

Since the end of World War II the principal threat to the security of the United States has been the massive conventional and strategic nuclear armed forces of the Soviet Union. For the U.S. Army the primary focus has been on fighting any future war against Soviet and Warsaw Pact forces on the plains of Central

Europe.⁹ To successfully conduct this type of warfare required tanks, heavily armored tanks, and large numbers of them.

However, the past eighteen months have seen very dramatic changes in the situation in both the Soviet Union and Europe. The Warsaw Pact has ceased to exist; Soviet forces continue to withdraw from Eastern Europe as part of arms reductions agreements and as a result of emerging nationalist movements that mitigate against their continued presence; and even divided Germany, the common foe for both American and Soviet commanders in World War II is now reunited as one nation. The USSR also finds itself plagued with a myriad of domestic problems ranging from economic chaos to separatist Baltic states and religious strife in its moslem republics.

The shift from a bi-polar world aligned between the Soviets and the United States to a multi-polar world of loose alliances and increasing instability seems to be the most likely future defense scenario for the United States. Not that the Soviet Union has ceased to be a military threat, for the USSR remains the only nation capable of destroying the United States by virtue of its tremendous strategic nuclear capability. The fact is, the United States cannot ignore the Soviet's very credible ability to threaten our national interests with modern, powerful forces. What has developed instead is a wider threat to American interests in virtually every region of the world-- from the Middle East to the Americas. These potential threat forces range from highly developed, well-organized military and paramilitary units with sophisticated weaponry, to poorly organized groups who rely on small-unit operations, subversion, sabotage and terrorism to further political aims and objectives.¹⁰

What should be particularly alarming to American strategic planners is not only the increased volatility of the world situation and its global focus, but also the proliferation of modern, lethal weapons systems among Third World nations,

where the threat of a low to mid-intensity conflict is most likely. A combination of Soviet and American arms sales and military assistance programs, coupled with increasing domestic arms production and open market sales of weapons by other countries, has equipped developing nations with an arsenal of armored vehicles ranging from pre- World War II M-4 Sherman tanks to modern Soviet T-72s. Given the Soviet Union's woeful economic problems, arms sales in return for hard cash seems even more likely.

Relatively obsolete tanks have been upgraded to M1 and T-72 standards with a variety of retrofits ranging from the addition of laser rangefinders, improved fire control systems, enhanced armor protection that can defeat most existing chemical energy munitions, and significantly more lethal ammunition. Modified tanks are only slightly less lethal and survivable than their more modern counterparts, and their useful service life has been greatly extended.

Regional armor inventories have skyrocketed in the past 20-30 years, ranging from 80,000 tanks in Europe, 23,000 in Asia, 12,000 in the Middle East, 7,000 in Africa to some 3,000 in Latin America.¹¹ These diverse weapons systems may be modern or antiquated, imported or indigenous, but they will likely be effective on regional battlegrounds of the future. Older tanks, anti-tank guided missiles (ATGM), and recoilless rifle systems are still a deadly combination against a light force without tank support or extensive antiarmor weapons.

At the tactical and operational level the real threat is not the geographic region of the world in which the United States military might have to fight, but rather the weapons systems and technologies that we will encounter.¹² In order to deal with worldwide conflicts that range on the operational continuum from peacekeeping operations to mid and high-intensity conflict, the United States has for the past forty years maintained a defense policy that maintains sufficient forward-deployed forces (principally armor and mechanized infantry) to deter

general war while also retaining more readily deployable light contingency and reinforcing forces that are suited for the more likely contingencies of the Third World.¹³ I would contend, as do many other observers, that the reduced probability of conflict with the Soviet Union in Europe as evidenced by improved relations and the progress in the Conventional Forces- Europe (CFE) arms negotiations, coupled with the recent experience of Operation DESERT STORM, demonstrates that for the United States the projection of land combat power to virtually anywhere in the world will become the base case in future conflicts.

The United States Army currently addresses this contingency mission through the XVIII Airborne Corps, which provides a light infantry division (the 10th Mountain) and the 82d Airborne Division for initial deployment and the 101st Airborne Division (Air Assault) and 24th Infantry Division (Mechanized) for reinforcing roles. The 10th Mountain and the 82d Airborne Divisions are kept in a state of readiness for no-notice deployment and establishment of a lodgement area, but differ significantly in organic combat power. Only the 82d Airborne, among Army divisions, possesses a strategic forced entry capability-- conducted by parachute assault. To deploy the entire 14,000 soldier 82d Airborne and its associated equipment requires about 860 C-141B flights and 19 C-5 sorties for employment to an objective area.¹⁴

The 101st Airborne Division (Air Assault), equipped with a highly mobile fleet of tank-killing helicopters enjoys a decided edge in lethality over the 82d Airborne, but lacks a strategic forced entry capability and requires nearly twice the airlift, while the 24th Infantry Division (Mechanized) has no forced entry capability and markedly greater airlift requirements.¹⁵ The 24th Infantry Division has combat power in abundance, but it is not rapidly deployable. A force equipped with main battle tanks is simply too heavy to deploy by air when each 60+ ton M1A1 Abrams tank requires one C5 to airlift it. As a result, any

significant armored force must deploy by sealift, not airlift. In contingency operations time is of the essence, and always will be, otherwise no air deployment would be necessary in the first place.¹⁶ As some experts have suggested, a tank platoon (even a light one) airlanded (or airdropped) on Day 1 may be more critical to the success of the operation than an armored division landed on Day 30.¹⁷

The light infantry division has the advantage in that it can deploy in approximately 500 C-141 sorties, but it lacks the 82d Airborne Division's forced entry capability, has significantly fewer vehicles for mobility, at 10,000 personnel has less combat power, and can generally move only as fast as its infantry troops can walk. Of the two, only the 82d Airborne has its own armor unit (actually organic to XVIII Airborne Corps, but attached to the 82d), capable of aerial delivery by either cargo parachute, low altitude parachute extraction, or airland. This armored unit is the only force that in a contingency operation could land with assault troops and provide the mobility, firepower and shock effect necessary to destroy enemy infantry and armor forces.¹⁸

One glaring weakness of both divisions is the lack of a kinetic-energy weapon to defeat the improved frontal protection of modern armored vehicles that will be encountered on an increasing number of regional battlefields.

In conclusion, as a recent U.S. Army Armor Center paper points out, "as contingency operations become more likely and as potential enemies become better equipped, armor forces must evolve to become more deployable without sacrificing their lethality and versatility."¹⁹ Unfortunately, while the threat has changed dramatically in recent years, the Army's strategic armor force has simply not kept pace.

THE EXISTING SYSTEM

The Army's only current strategic light armored vehicle, the M551 "General Sheridan" originated in 1959 as a concept to replace both the existing M41 light tank and the M56 self-propelled anti-tank gun. The result was a vehicle that could serve as the principal reconnaissance vehicle for armor, infantry, and airborne units not equipped with the main battle tank. In 1960 General Motors was awarded the contract to produce the Army's first Armored Reconnaissance/Airborne Assault Vehicle (ARAAV), and actual production was begun in 1965 at GM's Allison Motor Car Division. The first production vehicle rolled off the assembly line in June 1966 and a total of nearly 1700 Sheridans were completed before production ceased in 1970.²⁰ Although several allied armed forces, including Australia and the United Kingdom, expressed initial interest and field tested the vehicle, no other army adopted the Sheridan, despite its rather advanced concept.

A total of 64 Sheridans saw service in Vietnam, where the vehicle amassed a rather spotty record. There were numerous deficiencies with the engine, chassis, transmission, suspension, and the conventional round for the 152mm main gun, which featured a combustible cartridge case.²¹ The all-welded aluminum armor hull of the vehicle proved vulnerable to both shaped-charge warheads of the Soviet rocket-propelled grenade as well as landmines. Partly as a result of their Vietnam service record, Sheridans were replaced by the M60A1 tank in all but airborne light armor battalions. Today the only combat ready M551s in the U.S. Army are the 57 assigned to the 82d Airborne Division. In addition, approximately 300 have been modified to serve as Opposing Force (OPFOR)

armored vehicles at the National Training Center at Fort Irwin, California, but serve no operational purpose.

The M551A1 Sheridan has provided the 82d Airborne Division and XVIII Airborne Corps a unique light armor capability since the vehicle was first assigned to the division in 1967. The vehicle is light enough to participate in airborne forced entry operations utilizing low-velocity airdrop (LVAD), low altitude parachute extraction system (LAPES), or airland insertion using the C-130, C-141, or C-5 aircraft. Its excellent mobility and unique 152mm gun/launcher system enables the vehicle to fire a wide range of munitions including an obsolescent Shillelagh missile (range: 2500 meters against moving targets and 3000 meters against stationary targets) and a number of conventional anti-personnel and anti-tank rounds. Coaxially mounted to the main armament is a 7.62mm M73 machine gun and a .50 caliber ring-mounted, anti-aircraft machine gun is located on the forward part of the commander's cupola.

SPECIFICATIONS

CREW	4 (commander, driver, gunner, loader)
COMBAT WT	35,500 lbs
HEIGHT	96 in (reduced)
MAX SPEED	43 mph
MAX RANGE	373 miles
MAX GRADE	60% slope
TRANSMISSION	Allison TG-250, 4 forward, 2 reverse speeds
ENGINE	6- cylinder, Detroit turbo-diesel, 300 bhp at 2800 rpm
ARMAMENT	1 x 152mm main gun 1 x .50 cal anti-aircraft machine gun 1 x 7.62mm coaxial machine gun

The Sheridan's major operational shortcomings, including turret mechanical problems, transmission failures, limited armor protection, and no Kinetic energy killing power are largely the result of age and obsolescent 1960's- era technology. A major deficiency, modern tank fire-control and night fighting capability was only hurriedly completed as the vehicles were deploying to Saudi Arabia.²² These improvements consisted of replacing the old fire control system with a day sight system coupled with an integrated laser range finder that significantly improves first round hit probability between 1200 and 1600 meters for conventional HEAT ammunition while adding a M60A3 tank thermal sight and Bradley IFV driver's night sight to make the vehicle as night-fighting capable as its supporting infantry. This product improvement plan (PIP) had been under discussion for some seven years before it was actually approved.

The Sheridan has experienced a respectable operational ready rate since its early automotive and combustible ammunition problems were overcome, however, due to its advanced age and low service density, logistical support by both Tank-Automotive Command (TACOM) and Army Munitions Command (AMCCOM) beyond 1995 will be extremely difficult.²³ While armament and automotive spare parts continue to remain in the supply system, the last major procurement of parts was in the 1977 timeframe, increasing reliance upon depot cannibalization to keep vehicles mission capable. Despite these efforts there have been numerous delays and spot shortages. This is not the level of reliability the U.S. Army requires in a system deployed for a contingency operation, bare-base and thousands of miles from the continental United States.

One area where the Sheridan does perform quite respectably lies in its unique operational employment as a part of the initial airborne assault, followed by a reinforcing echelon which deploys by LAPES or airland. The Sheridan is a rugged airdrop veteran, capable of fighting almost immediately upon landing. The vehicle

can be derigged from all airdrop equipment and be on its assigned combat mission within seven minutes. Additionally, the vehicle can be dropped with 28 rounds of main gun ammunition, machine gun ammunition and half a tank of fuel. As the vehicles proved during the combat assault into Panama, boresight and zero are retained after airdrop ²⁴ and the main gun and .50 caliber and 7.62mm coaxial machine guns give the light armor battalion an important role in a wide array of combat missions as well as considerably more firepower than other light divisions.

HISTORY OF THE ARMORED GUN SYSTEM (AGS)

The United States Army's interest in what has come to be called the Armored/Assault Gun System (AGS) seems to have almost coincided with general disenchantment with the M551 during Vietnam. In the intervening years the requirement for a versatile, readily deployable, yet lethal armor system to provide both anti-tank and infantry assault gun functions has changed direction almost as many times as it has changed its name:

1972- As Army interest in newly emerging technologies and their application to light combat vehicles increased, the Defense Advanced Research Projects Agency (DARPA) funded the development of a 20-ton, high-survivability test vehicle-light (HSTV-L). With a crew of 2 or 3, the HSTV-L mounted the developmental 75mm Medium Caliber Anti-Armor Automatic Cannon, and a highly advanced, variable fire control system incorporating a "hunter-killer" target acquisition capability.

1973-75- The United States Marine Corps conducted a series of studies aimed at meeting their service-specific need for an agile, mobile, direct fire anti-armor system that was capable of external transport by cargo helicopter.

1976-78- In 1976, the Armored Combat Vehicle Technology (ACVT) Program was initiated, with an Army project lead, USMC participation, and DARPA funding. A Department of the Army Systems Manager's Office was established in 1977 to construct a technology base for further Army and USMC development efforts. In 1978 the Army Training and Doctrine Command (TRADOC) established a Combat Vehicle Technology Directorate (CVTD) in conjunction with the Systems Manager's Office to further conduct the ACVT study. The study plan concepts included:

- o The Mobile Protected Weapons System (MPWS)- which was a pure anti-tank system in two separate versions.

- A helicopter-transportable USMC system.

- A 40-ton Army system.

- o MPWS II- a 40-ton Infantry Fighting Vehicle (IFV).

- o MPWS III- a 40-ton Cavalry Fighting Vehicle (CFV).

The ACVT study, which was completed in 1982, recommended a system based on a 75mm main gun in a low profile turret, fire control and mobility equal to the M1 main battle tank, and armor protection from 14.5mm penetration on the vehicle's front and sides.

1980- Several significant events occurred during the course of the ACVT study. In November 1980 the U.S. Army Infantry School completed its cost and operational effectiveness analysis (COBA) on what it christened the Mobile Protected Gun (MPG). The study investigated light anti-armor weapons systems for the new light infantry divisions (LID), with a concluding recommendation for a High Mobility Wheeled Vehicle armed with a Tube-Launched, Optically-Guided Weapons

System (HMMWV- TOW) and a 6x6 light armored, wheeled vehicle mounting a 25mm chain gun. The study also recommended the formation of a joint working group (JWG) consisting of representatives from TRADOC, USMC, the Army Materiel Command and the Office of the Assistant Chief of Staff for Intelligence to define and select promising technologies for a common U.S. Army/ USMC weapons system. The interim solution, HMMWV- TOW and wheeled 25mm light armored gun, led the Secretary of Defense to direct the Army to use the USMC Light Armored Vehicle (LAV-25) for that purpose. In September 1980, TRADOC approved a separate organization and operation plan (O & O) submitted by the Infantry School for a Mobile Protected Gun System (MPGS) for the light divisions that was not based on the LAV-25, but rather on a 75mm gun. The solution proposed two steps: a non-developmental item (NDI) approach for five years, and a separate, long-term developmental solution. This proposal was approved by the Chief of Staff, Army in September 1981 before separate study recommendations could be briefed by the Armor School. Efforts were hopelessly intermixed, and a subsequent General Officer review conducted in November 1982 recommended deferral of the MPGS pending development and demonstration of required technologies-- the recommendation was approved.

1982- With the Army's deferment on MPGS, the USMC continued with LAV-25 procurement and further development of a 75mm cannon for this vehicle. The Army proceeded separately with the development of HMMWV- mounted TOW and MK-19 grenade launchers for light forces.

1984- Following the Army's decision to defer MPGS, additional time was made available to examine advanced technologies and the MPGS initial required operational capability (ROC) was readjusted to encompass a viable technology to encounter a revised threat. This began the analysis of what was henceforth

Known as the Armored/Assault Gun System (AGS). The HMMWV-TOW was selected as an interim AGS and was immediately assailed as a poor choice since it did not have a multi-purpose main gun.

1985-86- In December 1985, the Vice Chief of Staff, Army (VCSA) approved the amended ROC for the Armored Gun System and supported its funding in subsequent meetings with the CSA. However, in House of Representatives Select Committee meetings later that month the CSA did not support funding of the AGS. In January 1986, the Army Staff did not support the AGS during the budget process because of the system's low priority and perceived OSD/ Congressional opposition. In May, the Armor Family of Vehicles Task Force (AFVTF) was given the mission of pursuing AGS as one of several light division combat solutions. In June, the Bradley Fighting Vehicle was rejected as an AGS candidate because it did not meet two key ROC requirements-- it was not C-130 air transportable and it lacked a Kinetic energy weapons system.

1987- During 1987 both the outgoing and incoming CSA reaffirmed the validity of the AGS requirement. In August, OSD approved the AGS program initiative for 600 NDI vehicles-- 166 for the 9th Infantry Division (Motorized), 54 for the 82d Airborne Division, 217 for reserve component Tow Light Anti-tank Battalions (TLAT) and 163 for war reserves and floats-- at an estimated cost of \$800 million. The ROC was approved for the second time in September. In October, a Joint Staff Operational Requirement (JSOR) was drafted, and a joint USMC/Army cooperative program was explored. However, in December the AGS was dropped from the Long-Range Research, Development and Acquisition Plan (LRRDAP) as unaffordable and the Army program was killed. The CSA issued a "promissory note" to replace all M551s by FY95. The USMC, meanwhile, decided to continue with a separate LAV-105mm program.

1989-90- In August 1989, the Commander, XVIII Airborne Corps highlighted the urgent need for replacement of the M551 Sheridan in the 3/79 Armor Battalion, 82d Airborne Division. In September, an AGS line was placed in the field LRRDAP for funding. In November, the Army Deputy Chief of Staff for Operations (DCSOPS) called for a General Officer Steering Committee (GOSC) meeting at Fort Knox to determine the needs of the force and the strategy to pursue AGS, if required.²⁵ The GOSC determined that there was in fact an Army requirement for an AGS. The acquisition objective for the AGS was set at 300 systems for planning purposes, with the first 70 production models to be airdrop capable. The GOSC also directed that the acquisition strategy would be a modified non-developmental item (NDI) one aimed at equipping the first unit with the AGS in FY 95. In September, a Project Manager Office for the AGS was reestablished at TACOM and an AGS market survey was distributed to industry to determine which would be interested in competing for an AGS defense contract as well as to evaluate the capability to achieve a non-developmental acquisition strategy.²⁶

OPERATIONAL REQUIREMENTS OF THE ARMORED GUN SYSTEM

As the history of the Armored Gun System clearly demonstrates, the search for a new weapons system to meet the requirements of direct fire support to the airborne division and other light infantry forces, while also incorporating emerging technologies to defeat an increasingly well-armored global armor threat, has been anything but successful.

In the 1985 Required Operational Capability statement, several recommendations emerged that have influenced AGS requirements to the present: first, a 105mm main gun was preferred over smaller calibers, both to "bust bunkers" in support of the infantry, as well as for its superior tank-killing power; second, air transportability was highlighted as critical for rapid deployment; and finally, tracked vehicles were preferred over wheeled.²⁷

The truth is, the AGS has languished for years as a "back burner" issue low on the Army's priority list. Neither the Infantry School, which referred to the system as the Assault Gun, nor the Armor School, which favored the more "tank-like" title of Armored Gun, seemed ready to champion the AGS as its own. The Infantry School knew something was needed, but was not sure exactly what that was-- while there were some in the Armor community who viewed the AGS as a potential threat to the main battle tank, especially the future Block III.²⁸

In 1989/90, a series of messages by the Commanding General, XVIII Airborne Corps, coupled with attention derived from the Sheridans' role in Operation JUST CAUSE, turned the heat up and AGS became a topic of considerable interest to the Army.²⁹ While the earlier ROC had stressed the air transportability requirement for the AGS, leaders of both the XVIII Airborne Corps and the 82d Airborne Division were adamant that any system proposed as a replacement for the Sheridan had to be capable of low-velocity airdrop insertion along with the initial assault forces to provide immediate direct fire support to the task force.³⁰

During 1990 the Armor School placed renewed emphasis on refining the requirements documents for the Armored Gun System, officially recognizing that the immediate need for AGS was due to a significant deficiency in support of light forces engaged in contingency force operations. No strategically (C-141B/C-17) or tactically (C-130/C-17) deployable, direct fire weapons system existed to provide the contingency force commander a readily deployable, highly mobile

anti-armor (Kinetic energy), anti-materiel (chemical energy) and anti-personnel capability to compliment those weapons systems found in infantry units.³¹ The 1990 ROC outlined the following characteristics for the AGS:

o Deployability- One configuration of at least one battalion (70 vehicles) must be capable of low-velocity airdrop from C-130, C-141B and C-17 aircraft and be capable of fighting with all weapons systems at least 15 minutes after derigging. The low-velocity airdrop (LVAD) capability was made a required capability, while low-altitude parachute extraction (LAPES) is now desirable. This is a complete reversal of the 1987 ROC, which made LAPES the requirement. The remaining AGS configuration must be capable of vehicle- powered roll-on, roll-off from the same aircraft for airland delivery. Both configurations should be on a common chassis and provide maximum commonality of systems.

o Lethality- The AGS should have a main gun of sufficient caliber to defeat a T-72 tank fitted with reactive armor at a range of 2000 meters as well as point-type defensive positions. This means at least a 105mm cannon capable of firing the AEI Kinetic energy round or its successors plus a chemical energy round. As Panama demonstrated, large caliber high explosive, anti-tank rounds readily penetrated 10-inch reinforced concrete walls and caused extensive damage to the interior of buildings.³² It must also mount an M240, 7.62mm coaxial machine gun and a flexible mount capable of mounting a .50 caliber machinegun at the commander's station. The AGS should store approximately 30 main gun rounds, at least half of which are to be accessible for immediate loading. The fire control system should have an integrated laser rangefinder and accuracy and target acquisition should provide a dual-stabilized (M1A1) fire-on-the-move capability for both the main gun and the coaxial machine gun. This is a significant upgrade over the 1987 ROC, which only required a

single-axis stabilized system similar to the M60A3 thermal sight with laser rangefinder. Night sights are required and both primary and auxiliary sights must retain boresight and zero following airdrop.

o Survivability- The system must provide mobility/agility equal or better than the M551 even with all add-on armor packages. It must have a cruising range of at least 480Km at 40 km/hour (160Km when configured for LVAD), and be capable of towing another AGS. There must be sufficient armor protection to ensure survivability against small arms and indirect artillery fire. Although the actual level of protection is classified, a likely level would be 7.62mm armor-piercing protection all-around the vehicle, 12.7-14.5mm frontal protection, and 155mm artillery airburst protection. The vehicle must also possess an add-on, modular armor capability to upgrade the level of protection, probably to 14.5mm all-around and 23-30mm frontal protection. These protection levels would be consistent with previously unclassified levels. The add-on protection package is not required to be on the AGS during initial airborne assault operations but should be air transportable and quickly installable by the crew only in order to afford upgraded protection during follow-on operations. Also, the vehicle must have an integrated crew Nuclear, Biological, Chemical protection system.

o Sustainability- Since the system will operate in austere conditions in its contingency role, it must possess very high reliability and the ratio of maintenance manhours per operating hour should be kept to a minimum. A standard operationally available rate of at least 90 per cent is required and the system should seek commonality of parts with the M1, Bradley Fighting Vehicle and other existing systems. The vehicle should also accommodate Preplanned Product Improvements (P3I) for a vehicular navigational aid system compatible with the Global Positioning System (GPS), as well as a light weight entrenching

blade. It must accept current and planned radio and secure voice systems and incorporate an external telephone for communication with supported infantry troops.33

In conclusion, the current ROC for the Armored Gun System provides for a modernized, airborne, light armor system with a strategic capability to function world-wide as part of a combined arms team engaged in forced entry or other contingency operations. The system is designed to provide light forces a number of advantages in areas where they are currently quite deficient: increased protected mobility; increased anti-armor/anti-material lethality; shock effect; and high technology on the battlefield.

EMERGING AIRDROP SYSTEMS AND AIRCRAFT

The most recent ROC for the Armored Gun System highlights one very key point as far as the airborne division is concerned-- the necessity of retaining the airdrop option for purposes of forced entry operations. This position has been maintained for two principal reasons:

- o Airdrop of personnel and equipment during the combat assault permits much more rapid assembly of combat power in the objective area than does airland, a lesson well-learned by the 82d Airborne Division during Operation URGENT FURY in Grenada.

- o Airdrop permits quick turnaround of transport aircraft for other follow-on missions, such as airlanding the second echelon. This is particularly important in less developed Third World scenarios where available airfields generally have limited maximum on-ground (MOG) off-load capacity.

The past two 82d Airborne Division commanders have often stated that they will always plan for a minimum of one light tank platoon (4 tanks) to be airdropped with the assault echelon, and the remainder of the company or battalion subsequently deployed by a combination of LAPES and airland.³⁴ In fact, there is not one single package in the 82d's Readiness Standing Operational Procedures that does not anticipate the low-velocity airdrop of a light armor package.³⁵ LVAD has become the primary delivery means chiefly because it is the only effective means to airdrop during periods of darkness, when airborne assaults are normally planned. Although LAPES during periods of limited visibility is possible when using night vision goggles, it is not routinely practiced, nor is that likely due to safety considerations.

This stated requirement for a LVAD capability for the AGS has in fact become the major limiting factor in the vehicle's weight and armor protection. The limitation is even more narrowly defined because the requirement is not only LVAD capable, but LVAD from the C-130 aircraft. The rationale is that the C-130 is likely to remain the primary U.S. Air Force tactical airdrop aircraft for the foreseeable future, and hence, represents the baseline factor for airdrop weight. Maximum airdrop weight for the U.S. Air Force's primary two airdrop aircraft, the C-130 and C-141B is 42,000 pounds. Currently, the C-141B is restricted to a maximum airdrop load of 38,500 pounds during peacetime training due to a rear ramp hinge pin constraint (During war or contingency operations this may be waived by the Military Airlift Command-- and was for Operation JUST CAUSE). The C-5B is capable of airdropping up to four combat loaded Sheridans, but it is unlikely that this aircraft would be used for combat airdrops due to its great size and vulnerability to ground fire.

Within the past several years the Army has increased the maximum airdrop capacity from 35,000 to 42,000 pounds. This permits the airdrop of an M551A1

combat loaded with 28 main gun rounds and half a tank of fuel. Although rigged weight may not exceed 42,000 pounds, the actual combat weight of the vehicle is capped at 35,500 pounds since the Type V aluminum airdrop platform, eight recovery parachutes, suspension slings and associated airdrop equipment weighs in at approximately 6500 pounds.³⁶

The emerging strategic airlifter, the C-17, which is scheduled to begin service within the next few years has a considerably greater airdrop capability than either the C-130 or C-141B, 51,000 pounds for a single load and 110,000 pounds total. The Army's stated goal is to increase the maximum airdrop capacity to 60,000 pounds, and the system should be operational at approximately the same time that the C-17 comes into full production.³⁷ One great advantage of the C-17 is its ability to deliver loads by either low-altitude extraction or LVAD, a unique ability not shared by the C-141B or C-5B.

Another limiting factor for any AGS is a maximum height and width restriction on the vehicle once it is prepared for airdrop. For both the C-130 and C-141B aircraft the maximum rigged height of an airdrop load is set at 100 inches and maximum width 108 inches. Since the Type V airdrop platform is 3.5 inches thick, this means the maximum allowable vehicle height (when reduced) is 96.5 inches, no small matter for an armored vehicle sporting fire control systems and antennas from its turret. The height restriction is even more complicated by what is referred to as the "tip-off" angle; essentially the airdrop load's ability to clear the ramp of the aircraft upon extraction without striking the aircraft's tail. For the C-5B this height restriction is increased to 112 inches, and for the C-17 the maximum increases even further to 126 inches.

The C-17 appears to have all the characteristics of a superb airdrop aircraft, and its ample cargo compartment coupled with a tremendous aircraft load capability would permit the future AGS to escape the very stringent weight

limitations specified in the current ROC. Unfortunately, with only 120 systems scheduled to be purchased by the Air Force this very capable airdrop system will most likely not be the most frequently used airlifter and the requirement tying the AGS to the C-130 does seem warranted.

AGS CANDIDATES

Shortly after the Project Manager's Office for the AGS was established in September 1990, work began in earnest on a market survey of commercial industry to determine if the technology really exists for a non-developmental armored gun system, as well as to determine which industries would be interested in competing for this defense contract. A special effort was made to include both foreign as well as American manufacturers, and to include wheeled as well as tracked vehicles. This represented a rather novel approach in that specific details in the form of an actual Request for Purchase were not provided, although sufficient requirements were adequate to gauge industry interest.

There was strong industry response to the market survey. Fourteen companies responded, eight United States contractors and six foreign, with nine indicating that they were interested in competing as prime contractors for the entire armored gun system. Additionally, one major prime contractor, General Motors of Canada (manufacturer of the LAV-105) indicated that they were interested but would not respond until the actual RFP was released.³⁸

A review of the market survey yielded a number of interesting points:

- Although the ROC was within current available technologies, there is no existing production model that successfully meets all system requirements.

- The Benet Laboratories lightweight, low-recoil EX-35 105mm cannon (discussed in detail later) was required or desired by 8 of the 9 possible contractors.

- The LAV-105 turret, designed by Cadillac-Gage Textron was required or desired by 5 of the 9 contractors.

- The M1 Abrams fire control system was required by 6 of the 9 contractors.

- A tracked vehicle was proposed by 8 of 9 possible contractors (exception was IVECO- Fiat wheeled entry, as well as the LAV-105).

- A main gun autoloader was proposed in all system configurations, in fact a manual system was available in only two systems.

- No actual logistics package exists for any system.

- The requirement to meet LVAD maximum weight and the minimum armor protection levels require some compromise.³⁹

EX-35 Cannon.

The EX-35 low-recoil 105mm gun was originally designed and developed by Benet Laboratories, Watervliet Arsenal, for joint use by the Army and Marine Corps during the previous Mobile Protected Gun Program. Design goals were: the lightest possible weight (2890 pounds vs 4700 pounds for M68 gun); accuracy equal or better than the standard M68 105mm gun; reduced force and impulse over the M68 for use in a more lightly armored vehicle. Gun design was begun in 1983 and terminated in 1985 with the manufacture of three prototype systems.

The gun achieves its "soft" recoil through an integral muzzle brake and a system of recoil and recuperator brake assemblies which essentially function as a shock absorption system during firing. Peak recoil force is reduced from 175,000 to 70,000 pounds. The gun is designed to mount an autoloader and can fire the new family of kinetic energy rounds as well as standard NATO 105mm ammunition.

The sabot capability substantially upgrades lethality against armored vehicles, as well as "battlesight" gunnery against targets at a standard range of 1200 meters without having to adjust exact ranges. The gun was adopted as standard by the USMC for the LAV-105 and the system has been successfully test fired from a LAV chassis with no degradation in accuracy and with the chassis remaining stable even while firing on a 30 degree cant.⁴⁰

U.S. CANDIDATES

LAV-105

General description.

The Light Assault Vehicle (LAV) is a lightly-armored, eight-wheeled, amphibious version of the Swiss-designed Piranha family of vehicles manufactured by General Motors of Canada for both the USMC and USAF. It has eight-wheel drive, independent suspension and a high horsepower per ton ratio which gives it excellent on and off-road capabilities. The LAV makes use of an automatic transmission, power steering, and power brakes. It has a crew of three. The LAV family comprises six variants ranging from the reconnaissance LAV-25 to the LAV Recovery vehicle. Top speed is close to 65 miles per hour; the vehicle can swim at 6.5 mph with no preparation required before entering the water; it is C-130 roll-on, roll-off capable and has been successfully airdropped using both LAPES and LVAD. The vehicle weighs 30,500 pounds combat-loaded, and uses the Ex-35 105mm gun and a 7.62mm coaxial machine gun for secondary protection. Armor protection is limited to 7.62mm armor-piercing incendiary tracer (APIT) penetration all-around and 155mm air burst.

Advantages.

While most AGS candidates are only prototypes, the LAV is already in service with the USMC (760+ units) and the USAF (225+ units), as well as the Canadian

and Australian armies. Automotive components are available in the federal supply system and commercially. The LAV offers significantly reduced transportation costs since, as a wheeled vehicle, it can travel on ordinary roads and bridges, reducing the need for low-bed trailer transport. The LAV has established an excellent maintenance record (4000 mean miles between major failures vs 500 miles for the M1 tank⁴¹, reducing spare part (PLL) requirements at unit level and greater vehicle mission availability than comparable tracked vehicles. Fuel consumption is also considerably less than tracked vehicles. The LAV is transportable by helicopter external transport by CH-53E or similar rotary wing aircraft.

Disadvantages.

The wheeled LAV does not have cross-country mobility equal to tracked vehicles in certain restrictive terrain. The armor does not meet the Army AGS requirement for 23-30mm frontal protection, nor is it sufficient to protect against 12.7-14.4mm flanking fire. Additional add-on armor upgrades would be required. The LAV-105 only carries 8 ready rounds of main gun ammunition, far fewer than the ROC states. There are some fire control deficiencies, field-of-view requirements and depression/elevation limitations that also fail to meet the ROC. Thermal sights will also have to be added to the current LAV to give it a true night-fighting capability. Although the vehicle is capable of LVAD, it must be modified (turret-ring lowered 4.5 inches) and tires deflated to meet the 96.5 inch height requirement.⁴² Additionally, there is concern that the length of the 105mm gun may cause tip-off problems during LVAD and LAPES extraction. As currently configured, the LAV-105 does not mount a .50 caliber anti-aircraft machine gun.

FMC Close Combat Vehicle, Light (CCVL).

General Description.

The Close Combat Vehicle, Light was developed and built by FMC in the mid-1980's to meet emerging Army requirements for a lightweight, large caliber armored gun system that could be quickly deployed to a global conflict area by Low Altitude Parachute Extraction System (LAPES). Significant features of this system are: EX-35 105mm dual-stabilized cannon capable of providing accurate KE and CE fire-on-the-move; day or night fire control using M1 tank components; a 19-round autoloader; a 550 horsepower, rear-mounted Detroit Diesel engine giving it a greater horsepower-per-ton ratio than the M1 tank; roll-on, roll-off air-transportability, including LAPES-certification; 3-man crew; 43 mph top speed with a 300 mile cruising range; 7.62mm M240 coaxial machine gun and .50 caliber commander's weapon; an all-welded aluminum construction with variable bolt-on steel composite armor gives 14.5mm frontal protection, 7.62mm APIT side protection-- capable of upgrade to 30mm frontal protection.⁴³

Advantages.

The CCVL has excellent lethality with its 105mm main gun, M1 fire control system, day and night target acquisition capability and an autoloader which is capable of a 12 round-per-minute rate of fire. The CCVL's mobility (26.7 hp/ton) exceeds that of the Sheridan (17 hp/ton). Since the CCVL would likely be deployed to an austere area for contingency operations FMC has installed an Automatic Diagnostic and Maintenance (ADAM) system in the vehicle to electronically collect, store, and display to the driver all information relative to the operation and performance of the vehicle.⁴⁴ The proposed vehicle shares many common parts with existing Army systems such as the M1 tank and Bradley Infantry Fighting Vehicle, which improves logistics interoperability and parts availability.

The complete powerpack can be removed in 40 minutes and the engine, transmission and cooling system are mounted on rails which can easily slide out of the vehicle for maintenance or replacement.

Disadvantages.

As currently configured, the vehicle is too heavy for LVAD. A combat-loaded CCVL weighed in at 38,100 pounds at the July 1990 Fort Bragg AGS Rodeo. To reduce weight to 35,500 pounds FMC has considered several options, including: removal of the Commander's Independent Thermal Viewer (CITV) and replacing it with an optical viewer; use of a newer lightweight track; and replacing the current M68 Rheinmetall main gun with the BX-35. The overhang of the 105mm gun may cause some problems with the tip-off angle, especially during LVAD. One problem with the chassis design is that the raised rear engine compartment prevents the main gun from being depressed at all over the rear of the vehicle. The vehicle, as presently configured, does not have an integrated NBC system, which is required. Additionally, since the CCVL is a prototype which has never been in production, FMC has expressed concern that it might require 24 months for delivery of a test vehicle that meets required deployability, lethality, and protection levels.⁴⁵

Cadillac-Gage Commando Stingray.

General Description.

The Commando Stingray light tank was developed by the Cadillac-Gage Textron Company in the late 1970's/early 1980's to provide a versatile weapons system for armed forces that required a vehicle with the lethal firepower of a main battle tank but with much greater tactical and strategic mobility. Priorities developed for the system include: a high lethality 105mm main gun that would fire standard NATO ammunition; high mobility; large operational range; low profile for

increased survivability; use of proven, common components wherever possible; light weight, and C-130 transportability.⁴⁶ The Stingray's layout is conventional with the driver's compartment at the front, fighting compartment in the center, and engine and transmission at the rear of the vehicle. The main gun is currently the Royal Ordnance L-7 low-recoil force 105mm, but Cadillac Gage has indicated that for the AGS it would convert to the EX-35 cannon with autoloader and LAV-105 turret, for purposes of weight savings. Fire control is provided by an optional dual-axis stabilized M36E1 day/night sight incorporating a laser rangefinder and a thermal sight. A 7.62mm machine gun is mounted coaxially to the main gun and there is a flexible mount for either another 7.62mm or a .50 caliber machine gun at the commander's station. The hull and turret are of all-welded Cadloy steel armor providing frontal arc protection against 14.5mm armor-piercing rounds and protection against 7.62mm APIT over the remainder of the vehicle. The power pack is a 535 hp eight-cylinder Detroit Diesel coupled to an Allison automatic transmission found in the M-109 self-propelled 155mm howitzer. Top speed is 42 mph with a cruising range of 300 miles. The vehicle has a 4-man crew.

Advantages.

One of the primary advantages afforded by the Commando Stingray is the fact that the vehicle is currently in production with approximately seven vehicles being produced per month. Engine, transmission, and automotive and fire control systems are based upon systems currently in service and offer commonality of maintenance and spare parts. The vehicle should have no problem meeting most ROC specifications or the trial schedule.

Disadvantages.

The existing Commando Stingray, at 46,750 pounds, is almost 11,000 pounds over the AGS maximum weight. Significant reductions in armor and/or chassis weight

is necessary in order to meet this required specification. Modification of the vehicle to incorporate the LAV-105 turret will be extensive. Overhang of the main gun may cause a problem in meeting the tip-off angle required in LVAD. Additionally, as currently configured, the vehicle does not meet the requirement for number of ready main gun rounds. NBC protection is not currently an integral system, this will have to be added.

Teledyne Continental Motors/General Dynamics Land Systems.

General Description.

The TCM/GDLS joint venture in the armored gun system competition is a relatively new entry, although the proposed vehicle, the "Slammer", is not. Originally developed as a sole-TCM project in the early 1980's, the vehicle was initially referred to as the light, future armored combat system, or LFACS. The LFACS represented then, and still does, a radical departure from standard armored vehicles, with an externally-mounted overhead main gun, crew in-hull configuration, and front-mounted engine. In designing the LFACS, TCM decided on a number of key requirements: roll-on, roll-off air transportability in C-130 and C-141 aircraft, as well as LAPES capable; maximum use of off-the-shelf components; 105mm main gun with autoloader; a fire control system with the same accuracy as the M60A3 main battle tank; high cross-country mobility; and a low profile to help its survivability on the battlefield.⁴⁸ The powerpack consists of a Cummins eight-cylinder turbo-charged diesel rated at 500 horsepower coupled to a General Electric hydromechanical transmission, the same combination used in the Bradley IFV/CFV. Top speed is rated at 45-50 mph with a cruising range of 300 miles on a 170-gallon fuel capacity. Chassis armor is comprised of a combination of rolled homogenous steel plate, steel and ceramic composite, ballistic aluminum and Kevlar, and ceramic appliques to provide 23mm frontal and

7.62-14.5mm side protection. Protection levels may be raised or lowered according to the threat or delivery method (airland or airdrop) through the addition of bolt-on armor plates. Although originally fitted with the standard M68 105mm main gun and ARES autoloader, the joint TCM/GDLS entry is expected to use the EX-35 gun. The ARES autoloader consists of a nine-round magazine which is fed by two ten-round transfer drums-- for a total of 29 rounds of ready ammunition. There is a rear storage area for a separate 13 rounds of ammunition which can be loaded manually. A 7.62mm machinegun is mounted coaxially with a similar weapon or .50 caliber mounted externally on the commander's cupola. Additional weapons, such as TOW or Hellfire anti-tank guided missiles, can be mounted in pods on either side of the 105mm gun. The vehicle is designed for a three-man crew.

Advantages.

The design of the TCM/GDLS system offers a number of inherent advantages. The hull floor is double spaced for improved protection against mines. The engine and forward explosion resistant fuel cell provide added crew protection, as does the fact that the entire crew is housed inside the hull. The driver's position is well to the rear of the first road wheel and increases his survivability in the event the vehicle runs over a mine. The power-to-weight ratio is an impressive 26 hp/ton. The 105mm gun is externally mounted, there is essentially no turret so it presents a very small target to enemy weapons, in reality only one meter square. From the airdrop viewpoint, the turret is well to the rear of the vehicle, resulting in much less barrel overhang and reduced possibility of tip-off problems. The complete powerpack can also be removed as a complete unit to facilitate replacement in the field.

Disadvantages.

The TCM/GDLS AGS has a present combat weight of 21 tons, too heavy to meet the LVAD requirement. Some cost savings can be obtained by replacing the current track with a light-weight FMC version and by removing the side armor plates for airdrop. This reduces weight to around 17.5 tons, right at the maximum airdrop weight. This operation is intended to be accomplished by two individuals using only on-board tools. One problem is the lack of all-round visibility on the part of the two turret crew members, whose vision is partially blocked on one side by the gun mount-- not a significant problem when firing from prepared defensive positions, but a potential target acquisition problem when on the move. Since this entry is a prototype and not a production model, TCM/GDLS has expressed some concern with meeting a quick delivery date for testing.

Martin-Marietta.

Martin- Marietta represented a newcomer among the armored vehicle producers expressing an interest in the AGS. The intent was to enter into a joint venture with the AAI Corporation which had already built a prototype elevated gun system known as the High Survivability Test Vehicle, Lightweight (HSTV-L) as a candidate in earlier AGS tests.⁴⁹ Although Martin Marietta showed initial interest in the competition, the corporation apparently decided that the technology was not sufficiently advanced to proceed with radical changes in the HSTV-L to meet the new AGS ROC, therefore, they have subsequently bowed out of the competition.

FOREIGN CANDIDATES

In addition to the American entries described above, five foreign manufacturers expressed interest in competing for the AGS. Initial response was somewhat

limited in scope so a less-detailed review of each of the applicants will be presented.

Hagglunds IKV 91-105 Light Tank.

The Swedish manufacturer Hagglunds expressed an interest in submitting its candidate for the AGS, based upon the IKV 91-90mm Tank Destroyer produced for the Swedish Army between 1975-78. The 105mm version has previously been produced for India. The vehicle chassis consists of an all-welded steel hull divided into three compartments with the driver at the front, fighting compartment in the center, and engine at the rear. The vehicle has 20mm protection over the frontal arc and a double-skinned side armor which reportedly gives increased protection against HEAT and high explosive penetration.⁵⁰ Three of the four-man crew are seated in the all-welded steel turret designed by Bofors, which mounts the German Rheinmetall 105mm super low-recoil gun capable of firing all standard NATO ammunition, including the newest kinetic energy rounds, or the Bofors 105mm. There is no autoloader and an unknown number of ready rounds. The Bofors 105mm is not U.S. safety certified and requires extensive redesign of both the tube and muzzle brake. The fire control system is likewise unknown, but is assumed to be inferior in capability to the M60A3 or M1 systems. The vehicle, which weighs in at just over 39,600 pounds is a little robust for airdrop and is powered by a 360 hp Volvo six-cylinder diesel with a power-to-weight ratio of only 20 hp/ton. Maximum speed is 40 mph with a cruising range of 120 miles cross-country or 300 miles on the road. Hagglunds has also expressed interest in using the LAV-105 turret and the EX-35 gun.⁵¹ The proposed entry is not a NDI solution and there are a number of unanswered questions that appear to make its candidacy somewhat weak.

Creusot-Loire Industrie.

The French armor manufacturer has proposed two candidates for the AGS, the MARS-105 and MARS-15 light tanks, both outfitted with the LAV-105 turret and EX-35 main gun. The MARS-15 is currently in production, but the MARS-105 remains under development at the present. Prototype lead time is at least 18 months and there are still a number of unanswered questions concerning autoloader, fire control system, protection levels, and production location, among other concerns.⁵² Viability of the Creusot-Loire entry is based largely upon the French Army's purchase of a MARS family of armored vehicles.

Thyssen-Henschel.

The German firm of Thyssen-Henschel has proposed its TH 459L armored vehicle as a candidate system for the AGS. There is no existing vehicle, in fact the vehicle is currently still in the design stages with the first prototype not due to be completed until December 1992.⁵³ The TH 459L uses the Rheinmetall 105mm gun, which although not U.S. safety certified, fires all standard NATO KE and CE munitions and is widely used among NATO forces. The system uses an unspecified autoloader. Fire control information was not available. The system generally lacks sufficient detail to be a serious contender for the AGS and the production response time to meet a first unit-equipped date of FY 95 seems somewhat dubious.

Alvis Stormer.

The British weapons manufacturer Alvis has submitted an AGS candidate based upon its Stormer low-profile, light armored vehicle. The Stormer is currently in production, but the AGS version would require major chassis redesign or

modification to meet the ROC. The system would also use the LAV-105 turret, an autoloader, and the EX-35 main gun. With only a 300 horsepower engine the vehicle is underpowered and rather small. As currently configured the Stormer would only marginally meet the AGS ROC.

IVECO- Fiat,

The Italian firm of IVECO- Fiat has proposed three variants as candidates for the AGS:

- The Centauro 8x8 wheeled light armored vehicle with OTO Melara 105mm turret.
- The Centauro 8x8 with the Cadillac-Gage 105mm turret mounting the Royal Ordnance L-7 105mm gun.
- The Centauro 6x6 with the LAV-105mm turret and EX-35 gun.

The three systems cannot meet many of the AGS requirements, primarily weight, since the heaviest weighs in at over 50,000 pounds. Using the OTO Melara turret the gun is not U.S. certified and has no autoloader. It also fails to meet depression and elevation requirements and provides incomplete information on the fire control system. There would be extensive modification required of the existing chassis and no assurance that the LAV-105 turret could be readily integrated into the vehicle design. At the present time, and given the lack of complete information, the IVECO entrants do not appear to be viable candidates for the AGS, although that might change. The Italian firm has an excellent history and reputation as one of the foremost builders of wheeled combat vehicles.

Product-Improved M551A2 Sheridan.

In addition to those candidate AGS systems outlined above, there is an element within the U.S. Army that has pushed for significant product improvements to the existing M551A1 as the quickest means to acquire an upgraded airborne Armored Gun System. Proposed upgrades include:

- Incorporation of the LAV-105 turret, autoloader, and EX-35 105mm main gun to the existing Sheridan chassis.
- Development of a 152mm armor-piercing disposable sabot (APDS) round if the 152mm gun is retained.
- Replacement of engine and transmission with more modern automotive powertrains similar to the Bradley IFV.
- Upgrade of the existing fire control and night driving viewers (already upgraded to M60A3, could be upgraded to M-1).
- Addition of ceramic/Kevlar applique armor to upgrade protection levels.

While the product-improved Sheridan might meet the airdrop weight and survivability requirements, concerns still exist over logistical supportability, NBC protection, and electronics, among others.

SUMMARY

There are a significant number of potential AGS candidates available at the present time, although few can accurately be described as being truly non-developmental items. Most respondents felt that the first unit fielded target of FY 95 was possible despite concerns about delivery dates for test hardware to be used in a "shoot-off". The market survey has provided important feedback for acquisition planning and it appears there will be a substantial trade-off analysis required before the initiation of serious competition. The present schedule is for the formal Request for Purchase to be released to

industry in April 1991, with the contract award to be made in January 1992, and Performance Verification to be accomplished in the October-November 1992 timeframe.⁵⁴

CONCLUSIONS

The Army needs a strategic Airborne Armored Gun System to adequately support the contingency force commander's requirement to prosecute operations across the full continuum of conflict. This system can be expected to deploy as a key element of a tailored contingency force to conduct operations that may range from tactical/operational in scope to strategic-- anywhere around the globe. The AGS can expect to encounter a mixture of Soviet, Western and indigenously-produced equipment and a hybrid tactical doctrine that is neither totally Western nor exclusively Soviet. The overriding requirement must be to provide the contingency force commander with a combat vehicle possessing the strategic deployment/ forced entry capability, armored mobility, firepower, and shock effect necessary to gain the initiative, control the crisis, and accomplish the mission.

The AGS should normally be employed in concert with infantry forces, although it could be called upon to act independently as part of a mobile force. Military history since World War I has proven that in most scenarios the tank-infantry combined arms team is a far superior force than infantry alone.

The AGS would provide a survivable, air-deployable, highly mobile, Kinetic energy and chemical energy lethality to fill a void present in the current light infantry force structure. It can operate in all weather and climatic conditions, and is capable of operations in limited visibility and at night. It provides crew survivability against indirect fire, small arms fire, and anti-tank weapons fire when enhanced with add-on armor. Specific operational capabilities should include:

(1) Deployment- The AGS would deploy as part of the larger contingency force by either strategic or tactical airlift. This force might require forced entry into the area of operations by airdrop by all or a portion of the force, as well as airlanding by follow-on elements.

(2) Lodgement Area- The AGS would be initially employed in the seizure and rapid expansion of the lodgement area and its subsequent defense. The vehicle possesses both the firepower and mobility to quickly reinforce infantry forces on the lodgement perimeter or to conduct mobile reconnaissance and security on high speed avenues of approach.

(3) Defensive Operations- In the defense, the AGS would be positioned to provide high volumes of direct fire against enemy forces as they close within effective range. Wherever possible, AGS and anti-tank guided missile (ATGM) weapons systems should be integrated to permit the ATGM to engage enemy vehicles at long range, while the AGS maneuvers to close in and destroy the enemy from defilade. In this manner the two systems would have a synergistic effect on one another, and could enhance each other's strengths and offset inherent weaknesses.⁵⁵ The lightly armored AGS is not intended to be a main battle tank and should not be employed in such a manner as to slug it out

tank-to-tank. Instead, it should use stealth, agility, and a shoot-on-the-move capability to hit the enemy on the flanks or similar weak points. Survivability rests more on the system's low profile and agility than on heavy armor protection. The AGS would be an ideal weapon for the conduct of counterattacks or spoiling attacks by the contingency force commander.

(4) Offensive Operations- In offensive operations the AGS could again capitalize on mobility and high volumes of effective fire using a wide range of munitions. It could operate as part of a combined arms team to support infantry forces with suppressive and close-in direct fire from its main gun and machine guns, or it could be called upon to operate independently against enemy infantry and armor. Because of its light armor, the AGS should not be employed in a direct assault role where the enemy has anti-tank weapons unless it has been upgraded with additional add-on protection. When operating with dismounted infantry it should normally be employed in a fire support role from defilade positions with the infantry providing close security.

(5) Reconnaissance/Security- A contingency corps AGS would provide the corps with the same mission capabilities that the Armored Cavalry Regiment provides for a heavy corps, except that it would be capable of rapid deployability by airlift and less capable against a heavy enemy force than the heavy ACR.

(6) Additional roles and missions- When employed as part of a contingency force, AGS capabilities are ideal for application in a variety of specialized roles and missions. The mobility and protection provided by the AGS makes it well-suited for support of noncombatant evacuation missions (NEO), convoy security, border patrol operations, military operations in urban terrain (MOUT), and peace-keeping operations.

The Army must continue to consolidate and fully support efforts to field a strategic Armored Gun System as a replacement for the M551A1. The Sheridan's 1960 technology has been band-aided with product improvements that make it only marginally effective on the modern, highly lethal battlefield. What the Army needs is a modern weapons system that is strategically deployable, but which possesses great lethality of its own, as well as acceptable levels of survivability. Survivability does not mean just armor protection; the AGS will never be another main battle tank, rather it should exploit state of the art technology to minimize the probability of being detected, hit, or killed.

The development of AGS should not be viewed as a threat to the development of future main battle tanks; it should compliment, and not be developed in lieu of the MBT. While it is true that a lethal, highly survivable force is useless if not readily deployable to where it is needed, it is similarly true that a highly deployable force is of limited value if it is not survivable once deployed. What is needed is a combination of forces in balance that optimize the positive characteristics of both combat systems.

RECOMMENDATIONS

The Army should proceed with efforts to select a modified non-developmental candidate for the Armored Gun System from among those systems discussed in this study. The goal of equipping the first unit with the AGS by FY 95 should continue as planned. Operation DESERT STORM has vividly demonstrated the pressing need for a strategic AGS.

First priority for AGS fielding is as a replacement for the Armored Reconnaissance/ Airborne Assault Vehicle (M551A1) in the 82d Airborne Division's light armor battalion to provide a technologically upgraded vehicle

capable of strategic deployment by air and forced entry capable by airdrop. A separate company of AGS should also be added to the 3rd Battalion, 325th Airborne Infantry in Italy if that unit is retained as part of U.S. Army Europe.

The Army's future mission will increasingly be one of rapid deployment to regional troublespots. The time has come to significantly increase the strategic combat power of the XVIII Airborne Corps and the Army overall by forming a light armor regiment/brigade comprised of two active component AGS battalions and 3-73 Armor Battalion from the 82d Airborne Division. Such a light armored cavalry regiment could be configured and employed similar to the armored cavalry regiment of a heavy corps. While an airland roll-on, roll-off capability is required for the AGS in these two new organizations, there is no requirement for them to be airdrop capable.

Should the future Army force structure retain I Corps, which currently has a contingency/reinforcing mission in the Pacific, consideration should also be given to forming another light armored cavalry regiment for this corps as well, perhaps a roundout unit. The U.S. Army Armor Center should aggressively take the lead to develop such a light ACR for contingency force projection. Since the proposed acquisition objective for the AGS has already been set by Congress at 300 vehicles⁵⁶, these recommended organizational changes would provide the Army with far greater strategically deployable combat power for contingency operations than it has ever enjoyed.

Tomorrow's Army will have to prove that it not only has the capability to deploy strategically, but also that it has a credible combat capability once deployed. This will be increasingly difficult if global weapons proliferation continues at the present pace. Our force that fills this worldwide contingency role must be increasingly capable, deployable, versatile, lethal and survivable.

In conclusion I would like to stress the urgency for immediate fielding of a Strategic Armored Gun System. As former Commander-in-Chief of U.S. Army Europe, General Frederick J. Kroesen, has so eloquently stated, "we owe to our soldiers the best equipment we can buy. Anything less is a breach of faith and a courtship of dishonor by the people of the United States."⁵⁷ Besides, the time has come to reduce at least one unnecessary risk factor in worldwide contingency operations.

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